

## -20V/-2.4A P-Channel MOSFET

### Features

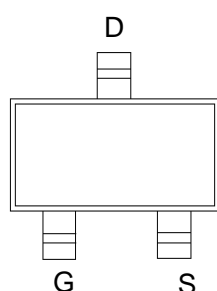
- Trench Power LV MOSFET technology
- High density cell design for Low  $R_{DS(ON)}$
- High Speed switching

### Application

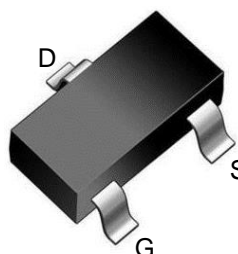
- Battery protection
- Load switch
- Power management

### Product Summary

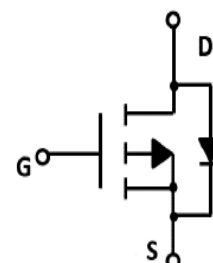
$V_{DS}$	$R_{DS(ON)}$ MAX	$I_D$ MAX
-20V	55m $\Omega$ @-4.5V	-2.4A
	80m $\Omega$ @-2.5V	



Marking and pin assignment



SOT-23 top view



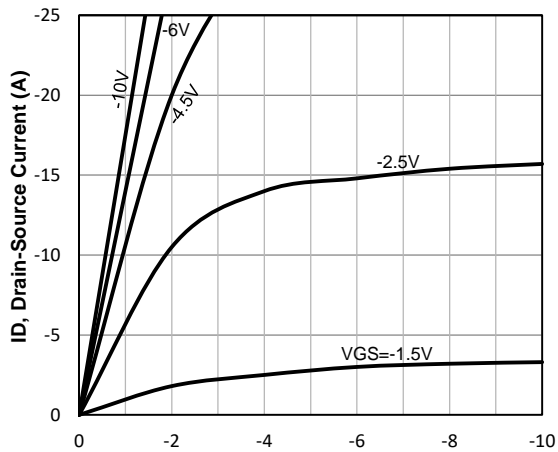
Schematic diagram

### Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

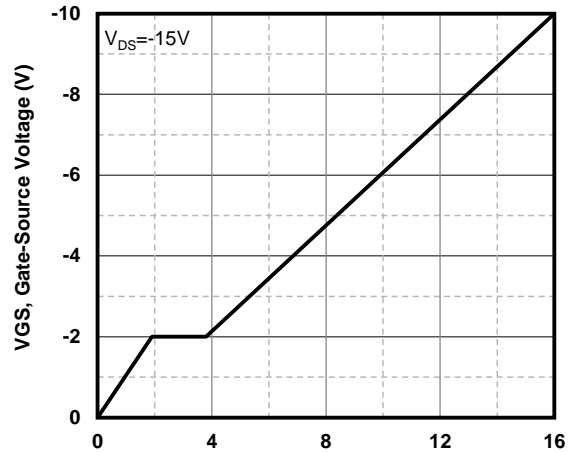
Symbol	Parameter	Rating	Unit
<b>Common Ratings (<math>T_C=25^\circ\text{C}</math> Unless Otherwise Noted)</b>			
$V_{DS}$	Drain-Source Breakdown Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-50 to 155	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ -2.4	A
<b>Mounted on Large Heat Sink</b>			
$I_{DM}$	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ -10	A
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$ -2.4	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 0.5	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	250	$^\circ\text{C/W}$

<b>Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)</b>						
<b>Symbol</b>	<b>Parameter</b>	<b>Condition</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>
<b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
B <sub>V(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V	--	--	-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.6	-1.0	-1.5	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.4A	--	44	55	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.0A	--	64	80	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	--	780	--	pF
C <sub>OSS</sub>	Output Capacitance		--	75	--	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		--	40	--	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.2A, V <sub>GS</sub> =-10V	--	16	--	nC
Q <sub>gs</sub>	Gate Source Charge		--	2	--	nC
Q <sub>gd</sub>	Gate Drain Charge		--	1.9	--	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =-15V, I <sub>D</sub> =-1A, V <sub>GS</sub> =-10V, R <sub>G</sub> =3Ω	--	7	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	3	--	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		--	27	--	nS
t <sub>f</sub>	Turn-Off Fall Time		--	12	--	nS
<b>Source- Drain Diode Characteristics</b>						
V <sub>SD</sub>	Forward on voltage	T <sub>J</sub> =25°C, I <sub>S</sub> =-2.4A,	--	-0.85	-1.2	V

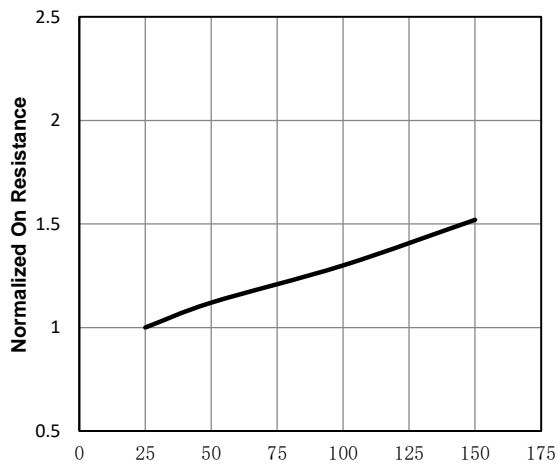
## Typical Operating Characteristics



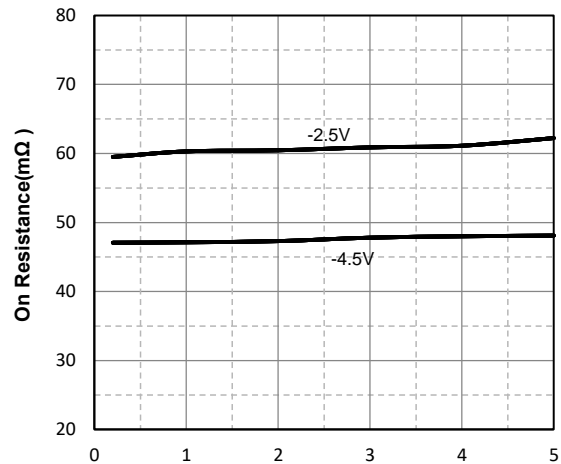
**Fig1. Typical Output Characteristics**



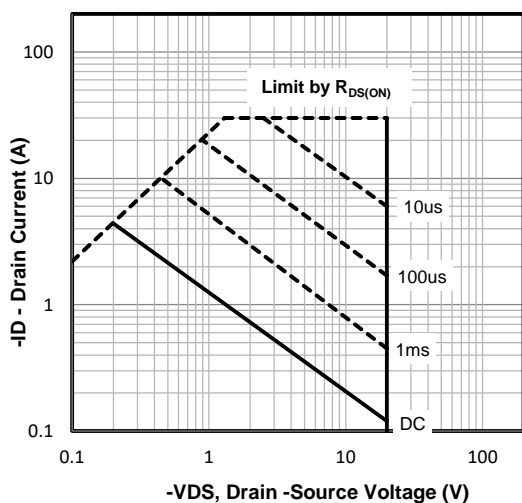
**Fig2. Typical Gate Charge Vs. Gate-Source Voltage**



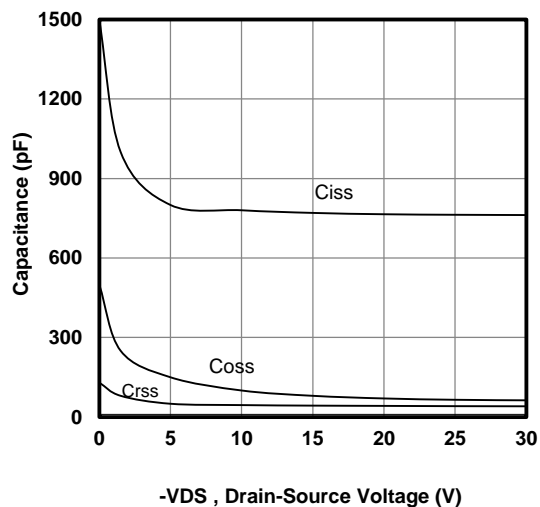
**Fig3. Normalized On-Resistance Vs. Temperature**



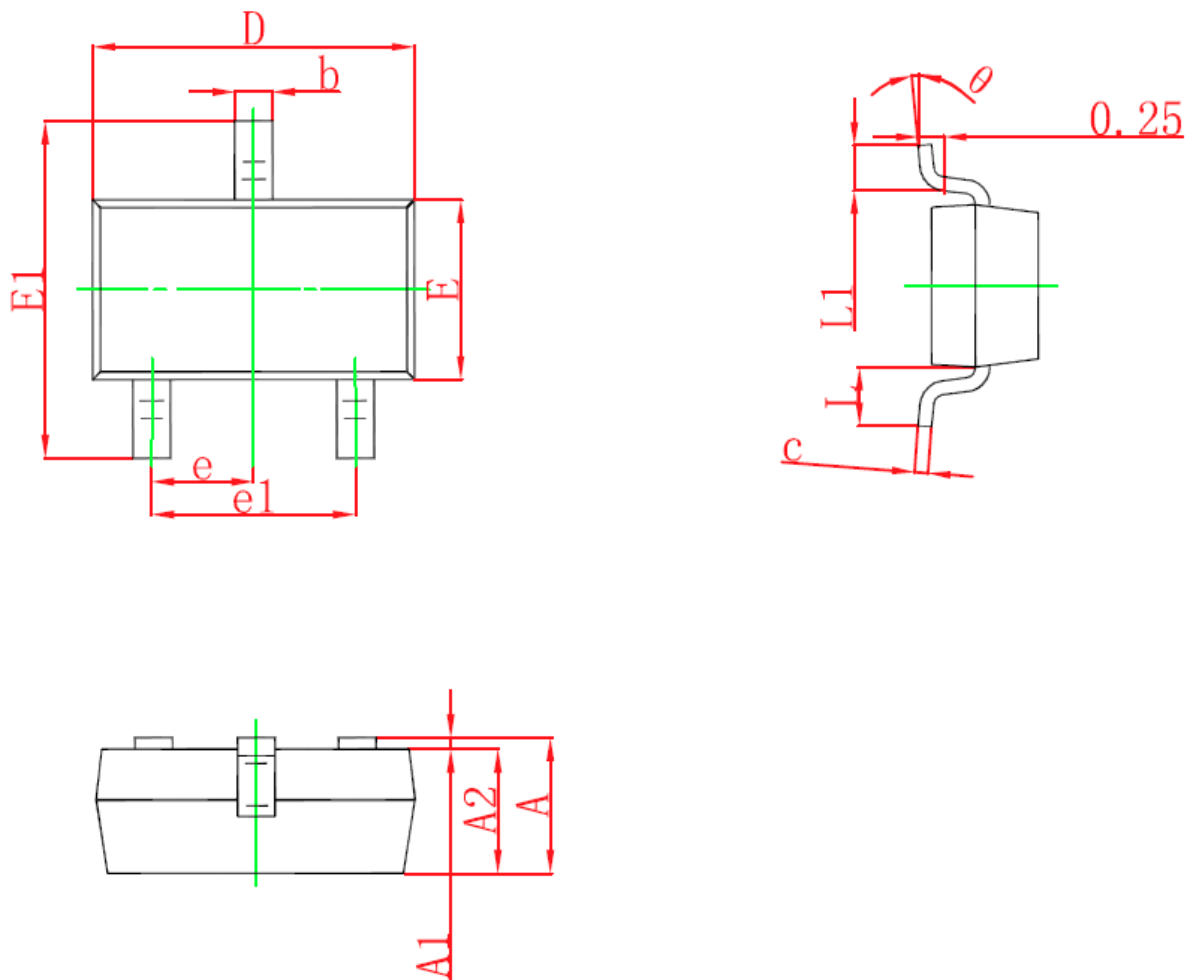
**Fig4. On-Resistance Vs. Drain-Source Current**



**Fig5. Maximum Safe Operating Area**



**Fig6. Typical Capacitance Vs. Drain-Source Voltage**

**SOT-23 Package information**


Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E1	2.250	2.550	0.088	0.100
E	1.200	1.400	0.047	0.055
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°